



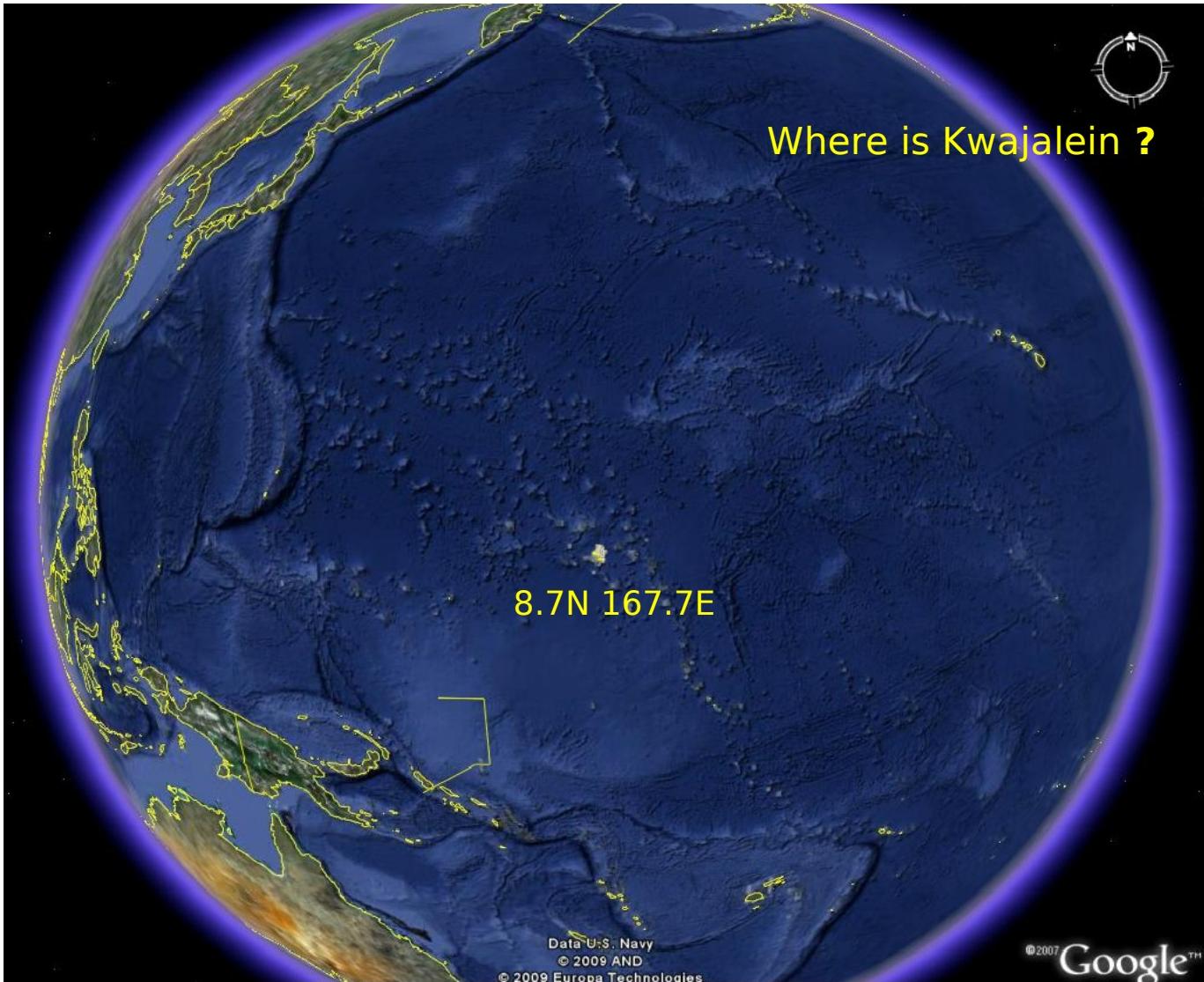
US Army Kwajalein Atoll Reagan Test Site (USA KA/RTS)



Thomas Tarlton
Atmospheric Technology Services Company



Army Space and Missile Defense Command





Army Space and Missile Defense Command





RTS Mission

- Ronald Reagan Ballistic Missile Defense Test Site (RTS) conducts continuous **24/7 Space Control Operations** in order to provide Space Situational Awareness and Operational Responsive Space capability from India to Canada, Surface to Lunar.
- RTS **maintains and modernizes the KREMS and instrumentation suite** to ensure the worlds' premier sensors provide threat overmatch and test capability.
- On order, plan, coordinate, execute, and analyze **missile and other vehicle testing** in the range area in order to validate and improve the capability of defense programs and ensure warfighting capability.
- On order, plan, coordinate, execute, and analyze **space launch missions** in order to support national space and combatant command objectives.
- Be prepared to plan, coordinate, execute, and analyze **training missions** in order to support operational readiness of defense warfighting forces.



Space Reconnaissance Space Object Identification (SOI)





ICBM Tests





Missile Defense Tests





Army Space and Missile Defense Command



Government and Commercial Space Launches





Army Space and Missile Defense Command



KREMS Radar Sensors (Kiernan ReEntry Measurement Site)





Telemetry



Kwajalei
n

Unclassified

Roi-
Namur



"Secure the High Ground"



Optics Instrumentation





Range Flight Safety Systems

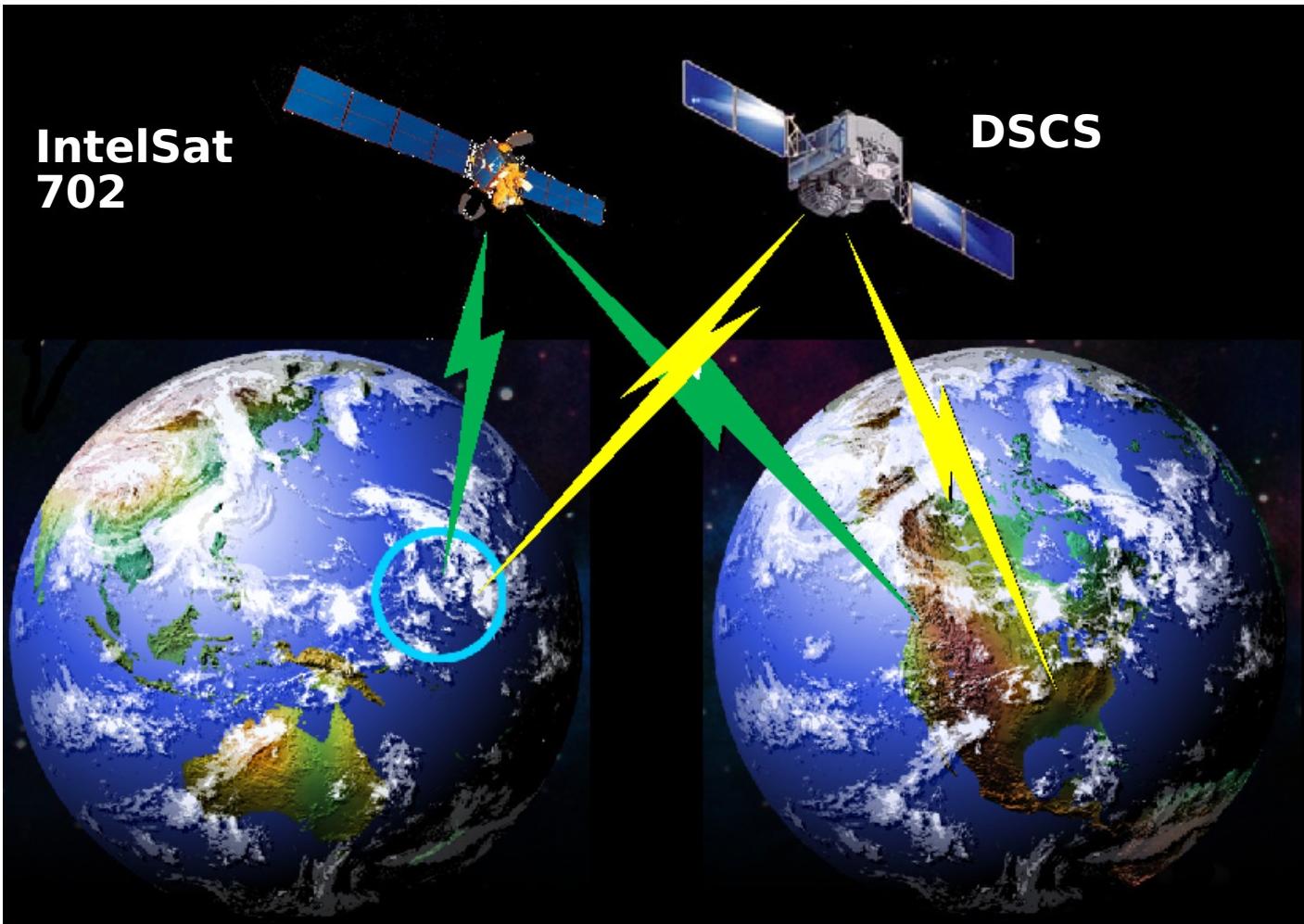


Kwajalein Mobile Range Safety System, KMRSS Worthy





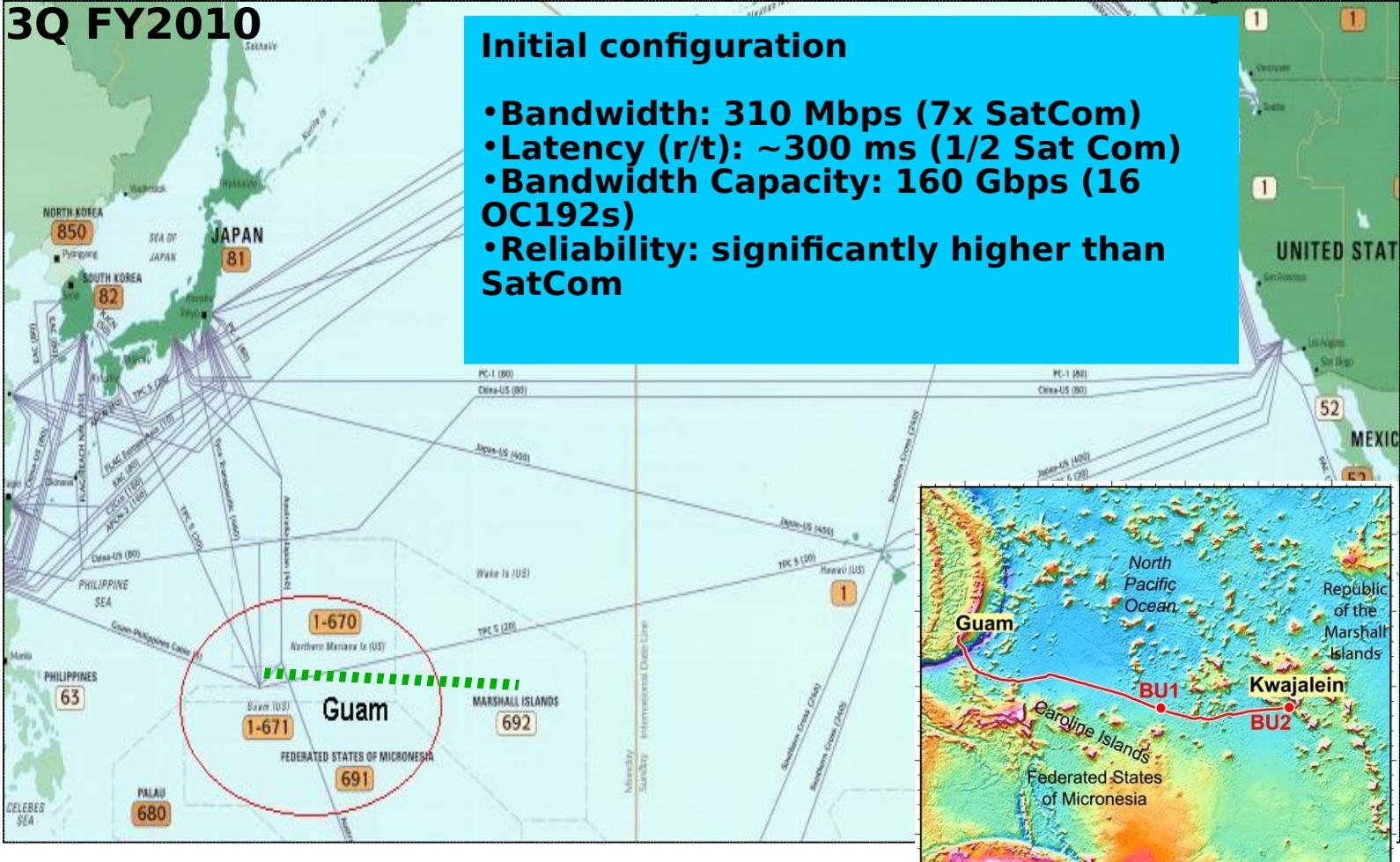
Communications Satellite Links to CONUS





Communications Fiber Connection to Guam estimated completion

3Q FY2010





Meteorological Support Forecasting Services

- USAKA Support

- Aviation
- Marine
- Public Service/weather warnings

- RTS Mission Support

- Mission specific weather parameter forecasts
- Mission weather constraints
 - Terminal area weather criteria forecasting and monitoring
 - Launch area
 - » Ground Safety...lightning prediction and detection
 - » Flight Assurance...Triggered lightning avoidance criteria
- Airborne sensor support
- Wake Island support
- Consultation Services
 - » UDS meteorological requirements documents
 - » Climatology

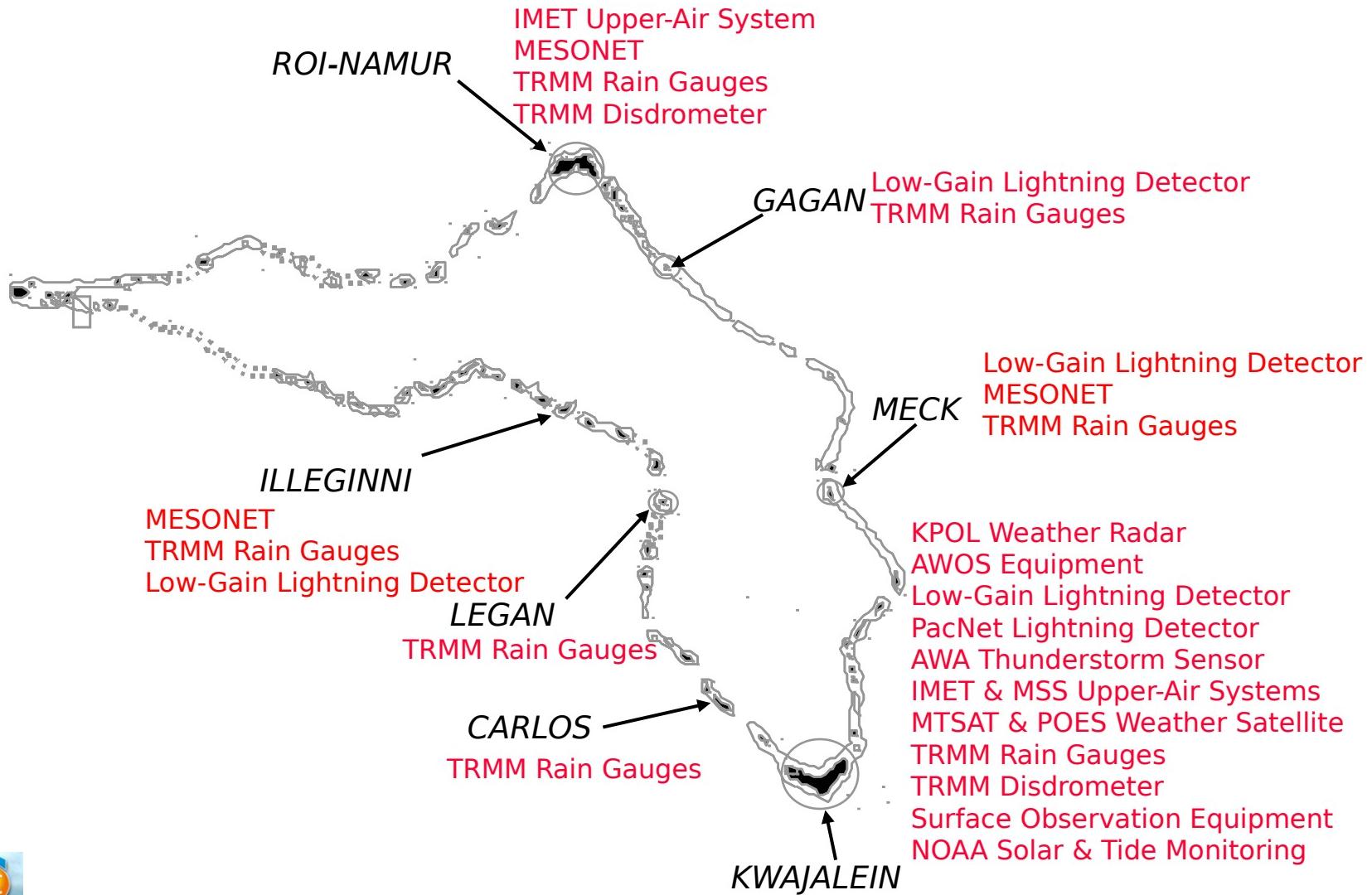


Meteorological Support Observation Services

- Surface Observations
 - Aviation observations/ METAR and SPECI
 - Mission specific observations
 - Climate observations
- Upper Air Observations
 - Synoptic soundings, 0000Z and 1200Z
 - World Weather Watch
 - Local aviation and forecast support
 - Supplementary soundings during tropical cyclone threat
 - Mission specific soundings
 - Radar refraction corrections
 - Environmental effects upon reentry bodies
 - Local launches
 - » Launcher settings
 - » Wind loading
 - » Shear
- Radar Observations
 - Severe weather watch
 - Mission weather constraints evaluation
 - NASA TRMM ground validation site



Systems and Facilities Sites



Unclassified

"Secure the High Ground"



Systems and Instrumentation Kwajalein Polarimetric Weather Radar (KPOL)



Service Date: 1993 to present
Operated 24/7

Dual Polarized Doppler
Surveillance and Volume
Scanning modes of operation

Wavelength: 10.71CM
Frequency: 2806.18 MHz
Beamwidth: 1.1deg horiz/vert
Peak Power: 407 kW
Minimal Discernable
signal: 107 dbm

PRF: 396 960
Range: 378 km 156 km

Radar data delivered via VPN
tunnel to remote Operations
Office in Norman OK



Systems and Instrumentation

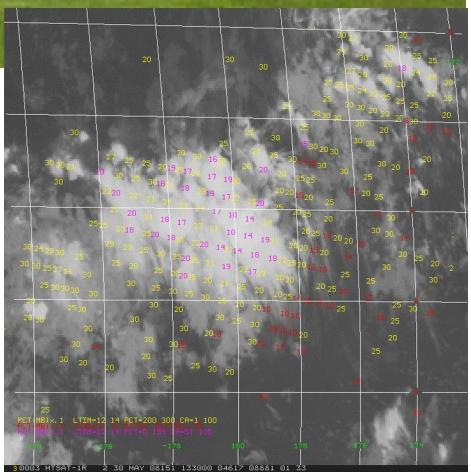
POES Direct Readout Satellite System



L-Band Ground Station

Dual Frequency: 1698 and 1707MHz

Receives NOAA AVHRR HRPT and
TOVS data



McIDAS system used for imagery display and analysis, and TOVS data processing analysis. (CO₂ slicing for cirrus detection and top height assessment.)

Supplementary access: Mark IVB software



Systems and Instrumentation Geostationary Satellite System



Direct Ingest
MTSAT-1R

McIDAS for processing,
imagery, display and
analysis.

Supplementary access:
Mark IVB software



Systems and Instrumentation

Radiosonde Systems



Three fixed systems

2 - International Meteorological Systems (IMET)

1680 MHz operating frequency

GPS radiosondes for wind and altitude

1 - Meteorological Sounding System (MSS)

Developed in 1960's specifically for Ranges

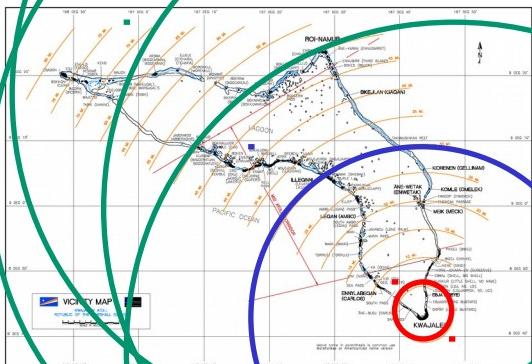
Transponder radiosonde, slant range used

to compute wind and altitude

MSS essentially obsolete, used as backup



Systems and Instrumentation Lightning Safety Network



- Low-Gain System
- AWOS System Thunderstorm Sensor
- Radar: coverage from beyond red circle out to 150 km
- Ultra-High Gain System: Pacific-wide coverage (not shown)



Multiple detection systems in use

- Low Gain System: Atoll region coverage, using 4 Vaisala IMPACT ESP detectors with 50 nm nominal range (150 nm max) deployed about the atoll, providing input to a central processor which positions lightning discharges.
- AWOS thunderstorm sensor: coverage out to 30 miles from Kwajalein Island, a single point detector providing general range and direction positioning of cloud to ground strikes and offering some optical detection of in-cloud and cloud to cloud discharges.
- Ultra-High Gain system, PACNet, providing Pacific wide strike location. Kwajalein Weather station maintains a sensor in the network in exchange for strike data.

Lightning prediction

- KPOL reflectivity returns analyzed for indications of ice concentrations at high altitudes within convective clouds. At Kwajalein, a return of 30 dBZ above 30,000 ft correlates well to potential for lightning production.

Unclassified

TS-1014-14



Operations External Information Access

- Text Warnings and Bulletins:
 - JTWC issuances
 - AMHS
 - Internet
 - NADIN
- Model Products:
 - JMV Metcast
 - McIDAS
 - Internet
- Observations:
 - McIDAS
 - Internet
 - NADIN



Operations JTWC Product Usage

- ABPW10....Monitored daily
- WTPN....upon receipt, analyzed for potential impact upon USAKA/RTS operations and facilities.
 - Our primary interests include Kwajalein Atoll, Wake Island, and locations where RTS assets may be deployed.
 - Secondary interest includes the RMI area.
- WTPN....USAKA/RTS Commands provided assessment of threat based upon predicted track, intensity, and wind field. HURREVAC software tool used in analysis.



Tropical Cyclone Vulnerability Surf and Storm Surge

Island elevations are quite low, generally 6 to 8 feet above MSL. Some islands have a protective berm a few feet in height along parts of the shoreline.

Protective reef flat is very short, and surf zone close to islands. Combined effects of wave setup, run-up, and surge result in inundation.





December 2008 Flooding Event Roi-Namur

- High surf event, produced by a long-period north swell.
- Inundation occurred during three consecutive high tide periods, though we were experiencing





Tropical Cyclone Vulnerability Destructive Wind

Considerable older metal sided facilities exist, which have been weakened by the corrosive salt air environment. These are particularly susceptible to wind damage and represent a source of hazardous flying debris.



It Ends Here

